Inaugural Meeting of the
Advisory Committee for the Sustained National Climate Assessment
13-15 September 2016

Location: Herbert C. Hoover Building (HCHB) Room 48019
Department of Commerce
1401 Constitution Avenue, NW
Washington DC 20230

Presentations for this meeting have been posted on the Advisory Committee's website:
http://sncaadvisorycommittee.noaa.gov/Meetings/MeetingDocuments.aspx

Contents

Executive Summary

The inaugural meeting of the Advisory Committee for the Sustained National Climate Assessment convened September 13 – 15, 2016 in Washington, DC. The meeting informed the 15 members about the Advisory Committee's charge and United States Global Change Research Program's (USGCRP) ongoing sustained assessment activities. The Advisory Committee is charged with advising USGCRP and its member agencies about opportunities for transitioning from punctuated quadrennial assessments to a more sustained process. Pursuant to duties imposed by law upon the U.S. Department of Commerce, including the Global Change Research Act of 1990 (GCRA), 15 U.S.C. §§ 2921 et seq., and the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. App. 2, the Advisory Committee will provide advice on the engagement of stakeholders and on sustained assessment activities and the quadrennial National Climate Assessment (NCA) report to enable the federal government to effectively and efficiently meet the demands for climate information.

In Session 1, Dr. John Holdren, Director of the Office of Science and Technology Policy (OSTP), spoke to the charge given to the Advisory Committee. Dr. Ann Bartuska, Chair of the Subcommittee on Global Change Research explained how NCA4 represents an opportunity to address social and behavioral aspects of climate change. Dr. Michael Kuperberg, Director of the Office of the USGCRP informed the Advisory Committee of progress to date in developing a sustained assessment process, with detailed information on the content of the Climate Science Special Report and the NCA4. Executive Director of the Advisory Committee, Ms. Laura Letson, provided background on the establishment of the Federal Advisory Committee (FAC) and its mandate, and described her role in working with Agency officials to ensure the Advisory Committee followed all ethics regulations. Dr. Richard Moss, Committee Chair and Ms. Jan Dell, Vice Chair, described the increasing demand for climate information and the role of the Advisory Committee in providing advice to the agencies to help meet these needs by establishing sustained relationships with stakeholders and producing a more diverse set of products than reports.

In Session 2, Dr. Virginia Burkett, Co-Chair, Subcommittee on Global Change Research, provided an overview of the role of the USGCRP in coordinating research and meeting the requirements of the GCRA. She described current USGCRP priorities including Arctic research, water cycle extremes, the carbon cycle with particular attention to methane, and development of cross-cutting capabilities including observations, modeling, and actionable science. She also pointed to the importance of framing climate as a risk management issue with uncertain future conditions.

Session 3 focused on the vision and goals of sustained assessment. Mr. Paul Fleming and Dr. Jerry Melillo discussed the findings of the special report, "Preparing the Nation for Change: Building a Sustained National Climate Assessment Process," prepared by the National Climate Assessment and Development Advisory Committee (NCADAC). They explained the enabling conditions identified by the report, including sustained engagement, fundamental science and methods, supporting infrastructure, and inputs from participating civil society organizations. Dr.

Melillo also discussed four components of the sustained assessment process: trust, recursive outreach, flexibility, and networks.

During the public comment session, Dr. Kuperberg addressed Advisory Committee questions about the potential implications of the pending political transition in the Executive Branch by explaining that the requirement for assessments is contained in the GCRA and will need to be met by any future Administration. Isamu Higuchi, Environmental Engineer, National Aeronautics and Space Administration (NASA), explained that efforts to assess and prepare for the implications climate change were occurring within legal authority of Executive Orders and instructions from agency personnel. Frank Niepold, Climate Education Coordinator, National Oceanographic and Atmospheric Administration (NOAA) Climate Program Office and co-chair of the USGCRP's Education Interagency Working Group, commented that the effort to build awareness and ensure utilization of NCA3 was not commensurate with the effort put into production of the report and requested that the committee consider whether additional effort was required to encourage uptake of report findings. The American Society of Civil Engineers provided written public comment that is available on the committee website.

On the second day of the meeting, Dr. Moss provided a recap of day 1 discussions, and Advisory Committee member comments pointed to the importance of gaining a better understanding of prior and ongoing assessment activities, understanding the distinction between assessment and "services", and enhancing dialogue between assessment producers and users. Dr. Kathryn Sullivan, Under Secretary of Commerce for Oceans and Atmosphere, thanked the committee for its service and noted the role of Ms. Letson in ensuring applicable FACA requirements are followed. She pointed to the value of sustained assessment in avoiding start-up and shut-down cycles and charged the Advisory Committee with providing ongoing advice on implementing a sustained and nimble process to take advantage of the large amount of data being produced by the Federal Government and research community. In response to Advisory Committee questions, Dr. Sullivan suggested it could be useful for the Advisory Committee to examine the role of the NOAA Regional Integrated Sciences & Assessments (RISAs), and the extension and boundary organizations of other agencies. She also asked the Advisory Committee to generate new ideas rather than to think of itself as an audit body. In response to other Advisory Committee member questions, Dr. Sullivan addressed prospects of improved interagency collaboration, pointing out that at local levels cooperation was strong, that equity issues need to be addressed to ensure that underserved communities have access to appropriate information, and that the sustained process should focus on several sets of time frames: 1-3 years, 10-20 years, and 50-70-100 years.

In Session 5, Dr. Kuperberg provided an update on ongoing activities of the USGCRP related to sustained assessment, including: preparation of NCA4 (planned for completion in 2018), a set of special reports, improvements to a pilot indicators program, and continuation of NCANet, a network of partner organizations. He noted development of new scenarios, and a broader range of products in the Climate Resilience Toolkit and the Climate Data Initiative. He also pointed out the value of the Advisory Committee maintain a clear focus on the assessment process because the USGCRP has other avenues for receiving general advice, for example an advisory committee of the National Academies and the President's Council of Advisors on Science and Technology. He closed his remarks by noting that USGCRP's vision for the future includes: playing a key

role as an information resource; and providing a mechanism for coupling understanding, projections, and user feedbacks. He recognized sectoral questions and needs will drive analyses and assessments. He sought advice from the Advisory Committee on achieving these goals.

Session 6 focused on the Climate Science Special Report and Quadrennial Report (NCA4) and included presentations by Dr. Don Wuebbles, Assistant Director for Climate Science at OSTP, and Mr. Ben DeAngelo, Deputy Director of USGCRP. Snapshots were provided of the expected contents of these reports, and the processes that are being used to develop them.

Session 7 explored several issues related to developing a strategy for sustained assessment through presentations of invited speakers. Rear Admiral Tim Gallaudet, Oceanographer of the Navy, Dr. Maria Carmen Lemos, Professor at the University of Michigan, Dr. Richard Wright, American Society of Civil Engineers (ASCE), and Dr. David Easterling, NOAA National Centers for Environmental Information (NCEI) briefed the Advisory Committee on the importance of considering stakeholder information needs in steering research and assessment, the use of the National Climate Assessments, and the importance and challenges associated with meeting public demand for climate information. Several approaches were suggested for overcoming these challenges including through a typology of use that links recurring information needs and reliable sources; the movement of information through "chains" of scientists, boundary organizations, and users; and by developing sustained dialogues with user communities (e.g., engineers and architects) by working closely with professional associations and other organizations.

At the start of the third day of the meeting, the committee split into breakout groups to plan next steps in developing its work plan. Two groups were formed, one to focus on information for design standards and a second on partnerships for actionable knowledge. In addition, both groups developed additional ideas for advisory products, given the input received thus far from the USGCRP speakers. Possible products for the committee include "on the spot" advice that the USGCRP draws from the Committee's discussions, consultation activities with targeted stakeholder groups, issues or options papers, special reports, pilot sustained assessment activities, and guidance documents. Dr. Moss presented an incomplete matrix of ongoing USGCRP products/activities related to a sustained assessment process and that the committee could use during the breakout sessions or beyond, to inform development of ideas to fill gaps.

During Session 9, Advisory Committee members heard options for products and tasks from the breakout groups. Based on the meeting presentations and subsequent discussions as a committee and in breakout groups, the Advisory Committee reached agreement on several items for the initial work plan, including (1) conducting a gap analysis to evaluate ongoing and planned elements of sustained assessment (using the framework of recommendations in the NCADAC special report on sustained assessment), and (2) establishing three task forces to develop options for future activities. The proposed groups would focus on the following topics: (a) partnerships for actionable knowledge; (b) climate data/projections for design processes; and (c) coastal community resilience.

Ms. Letson closed the meeting by reminding the committee that all the meeting documents will be posted to the website by the end of the week, and minutes will be posted within 90 days. NOAA will develop and approve a concept of operations for the committee. She will work with Drs. Sullivan and Holdren as needed. She will work with the Chair to schedule the next meeting in early 2017. Committee members should anticipate a call for new members and a request for nominations; it is possible that renewals will be considered. She reminded the members that they may contribute to NCA4 as individuals, and that the Advisory Committee would provide input to NCA4 only as requested. She expressed her thanks to the committee, the Chair, and USGCRP.

Meeting Actions

1. Develop Gap Analysis of Sustained National Climate Assessment (SNCA) Process
    a. Request status of USGCRP efforts on Indicators
    b. Modes of engagement within Regional Integrated Science Assessments/ Hubs/ Climate Science Centers
2. Establish subcommittees with initial action of scoping developing options for the work plan
    a. Partnership for actionable knowledge
    b. Coastal issues (impact and multiple factor evaluation)
    c. Climate data inputs into architectural/engineering design standards (scoping for others to carry forward)
3. Request additional information:
    a. Business Process Impact - briefing on Water Utility Climate Alliance report
    b. Tribal case studies

September 13, 2016
Session 1. Charge to the Advisory Committee

Opening Remarks by John Holdren, Director of the White House Office of Science and Technology Policy (OSTP)

Dr. Holdren thanked the committee members for signing up to serve and thanked the National Oceanic and Atmospheric Administration (NOAA) for housing and supporting the committee.

Dr. Holdren explained that since its creation 26 years ago, the U. S. Global Change Research Program (USGCRP) has provided the nation with knowledge and actionable data, including three National Climate Assessments (NCA) in 2000, 2009, and 2014, and the upcoming NCA4. He described the achievements of NCA3, which was released in 2014. Dr. Holdren relayed that state and local leaders expressed that the NCA3 was the first time they had received information and data about climate change from the government in a usable form. Dr. Holdren recommended NCA4 continue in this direction to be usable, accessible, and actionable and to produce relevant information for people in the places they live.

Previous assessments were produced in a boom and bust cycle, but moving forward the USGCRP is shifting to a sustained assessment model to issue reports and products on a continuing basis. The predecessor to this committee, National Climate Assessment and Development Advisory Committee (NCADAC), released a report on how to build a sustained assessment process that will help serve as guidance.

Finally, Dr. Holdren gave an overview of the OSTP structure for those new to the NCA process.

Discussion

Dr. Kim Knowlton asked what President Obama plans to accomplish on climate change in his remaining time in office. Dr. Holdren outlined a number of activities, including ensuring the ratification by 55 parties to the Paris Agreement and continuing to implement activities under President's Climate Action Plan. The President has indicated that climate change is a high priority; activities will be embedded through the transition, and work will continue at full speed until the finish.

Dr. Richard Moss asked about the status of the State, Local and Tribal Leaders Task Force. Dr. Holdren explained that this task force concluded its work after producing 104 recommendations for adaptation and resilience. However, engagement with state, local, and tribal leaders is still ongoing.

Dr. Jerry Melillo asked about progress that has been made in thinking about climate change as a national security issue. Dr. Holdren responded that a Presidential memorandum on this issue is soon to be released. The military is a leader in this space, both in assessing security threats related to climate change and promoting green technology and energy efficiency.

Dr. Susan Avery asked how this administration has engaged private industry and how this engagement could inform NCA4. Dr. Holdren answered that the President has emphasized the role of partnerships in many spheres and that climate change will be mastered with full engagement of the private sector. Industry leaders are regularly invited to talk about how they are addressing climate change and what more they could be doing in this arena, with one venue being the President's Council of Advisors on Science and Technology (PCAST.)

Opening Remarks by Ann Bartuska, Deputy Under Secretary for Research, Education, and Economics at the United States Department of Agriculture (USDA) and Chair of the Subcommittee on Global Change Research (SGCR)

Dr. Bartuska explained how the USGCRP views NCA4 as an opportunity to address the social science side of addressing climate change. The NCA4 lies at the intersection between science and practice with the goal of providing quality information that meets the needs of users.

Opening Statements of the Designated Federal Officer and the Committee's Chair and Vice-Chair

Following self-introductions by Advisory Committee members and the audience, Ms. Letson welcomed committee members and thanked committee members and NOAA/USGCRP colleagues for their efforts. She provided background on the establishment of the Federal Advisory Committee (FAC) and their mandate as outlined in the Advisory Committee's charter, outlined her role as the Designated Federal Officer (DFO) and reviewed FAC procedures. She stated that the committee shall function solely as an advisory body and shall comply with all applicable law and policies, including the FACA, the FACA's implementing regulations, applicable Department of Commerce guidance, as well as NOAA's Information Quality Act Guidelines. Advisory Committees operate independently of the agencies. As such, this Advisory Committee shall advise and recommend but does not decide or implement. Finally, she reported that in her role as DFO, a critical responsibility is to work with appropriate Agency officials to insure that all appropriate ethics regulations are satisfied. In that capacity, Advisory Committee members are briefed on the provisions of the Federal Conflict of Interest Laws. In addition, each Advisory Committee participant has filed a standard government financial disclosure report. Ms. Letson, along with the Department of Commerce Office of General Counsel, has reviewed these reports to insure all ethics requirements are met. The fifteen member of this Committee have received ethics and FACA training from the Department of Commerce Office of General Counsel.

Dr. Moss expressed the work of this Advisory Committee should be seen in the context of the effects of climate change on people, as recent flood events in West Virginia, Texas, South Carolina and Louisiana illustrate the increasing demand for climate information. The goal is to make this information available and accessible in various formats so that it can be used to

improve decision making under uncertainty to enhance resilience. He reiterated points made by previous speakers and welcomed the committee.

Ms. Jan Dell, vice chair, praised the committee members and the diversity of expertise and depth of resources they represent.

Discussion

The members expressed interest in how the NCA process could change under a new administration. Dr. Dunlap indicated that he was struck by the confidence of Dr. Holdren that climate initiatives would move forward, and he wondered how resilience could be built into the process, given that climate change is one of the most polarized issues in U.S. politics. Dr. Lemos indicated that she had been involved in the Second NCA, which was produced under the Bush Administration, and that the assessment process served as an opportunity for decision makers to engage on the issue.

Dr. Bartuska added the Advisory Committee role is not to develop an implementation plan but to advise the agencies working on NCA4. There are established user communities (e.g., municipalities) to work with, and depending on the community, different ways to provide information and maintain dialogue will be appropriate.

Dr. Moss concluded that the Advisory Committee will provide advice as requested by the USGCRP.

Session 2. United States Global Change Research Program (USGCRP) and Sustained Assessment

USGCRP Overview and Responsibility for Assessment

Virginia Burkett, Co-Chair, Subcommittee on Global Change Research (SGCR)

The USGCRP is mandated by Congress in the Global Change Research Act of 1990 to assist the Nation and the world in understanding, assessing and predicting global climate change. USGCRP is currently operating under four goals: (1) advance scientific knowledge of the integrated natural and human components of the Earth system; (2) inform decisions by providing the scientific basis to enable timely decisions on adaptation and mitigation; (3) conduct sustained assessments that improve the Nation's ability to understand, anticipate, and respond to global change impacts and vulnerabilities; and (4) communicate and educate the public on global change and develop the scientific workforce of the future. Currently, the USGCRP is prioritizing activities that require or benefit from the engagement of multiple agencies including Arctic related activities, water cycle extremes, and the carbon cycle with particular attention to methane. Additionally, USGCRP supports key enabling capabilities including observations, modeling, and actionable science.

Since 1990, the USGCRP has been charged with producing a NCA every 4 years. Starting with NCA4, efforts are directed towards a sustained assessment that will be better suited to provide

information for decision making. As part of this shift, USGCRP is producing more specialized reports, in addition to NCA4.

Discussion

The members discussed the three enabling activities of observations, modeling, and actionable science with Drs. Burkett and Mike Kuperberg with regard to inclusion of actionable science and exclusion of fundamental science. Dr. Burkett clarified that this list represents the collective priorities of all agencies, not their individual priorities. Programs within three agencies [NOAA Regional Integrated Science Assessments (RISA), USDA Climate Hubs (Hubs), and DOI Climate Science Centers (CSCs)] focus on applied science and science translation while fundamental science is not a collective priority of all agencies.

The members asked how the federal government has acted on past NCAs. A few members in the audience provided examples, including an assessment of NCA3 and the development of products like the U.S. Climate Resilience Toolkit. Ms. Kristen Poppleton added there are great examples of NCA use by the education community on climate literacy and energy awareness. Dr. Moss concluded the Advisory Committee could discuss the impact of NCA on federal policy in the future.

The members discussed the intended audience of the NCA and the extent to which the report is audience-driven. Dr. Jessica Whitehead, Ms. Dell, and Dr. Knowlton agreed on the need for two-way communication. They cautioned against burdening users by asking them about their needs in multiple forums as it causes stakeholder fatigue. USGCRP current activities include listening sessions in different geographic regions, the NCAnet forum, and formal public comment periods on the assessments.

Session 3. "Sustained Assessment" Vision and Goals, Part 1: Overview of Sustained Assessment Special Report

Sustained Assessment Vision and Goals

Paul Fleming, Climate Resiliency Group Manager, Seattle Public Utilities, and Jerry Melillo, Distinguished Scientist and Director Emeritus, The Ecosystems Center, Marine Biological Laboratory

Mr. Fleming discussed the findings of the special report, "Preparing the Nation for Change: Building a Sustained National Climate Assessment Process," prepared by the NCADAC. He highlighted the findings that climate change is a challenge for the nation, but current decision-making processes often do not take potential climate risks into account. Even when these risks are recognized, ways to address these risks are unclear. As the climate continues to change, the demand for actionable climate information will increase, and a new sustained assessment approach is needed to meet these needs.

Mr. Fleming described how a sustained assessment can more effectively support climate adaptation and mitigation decisions than the current process by enabling ongoing stakeholder

engagement and producing a diversity of products to support decision makers. Other critical elements of a sustained assessment include mechanisms to support enduring collaborative partnerships, and scientific foundations for managing risks and opportunities.

Dr. Melillo followed by summarizing the four components of the sustained assessment process as: trust, recursive outreach, flexibility, and networks.

Discussion

The members discussed in more detail what a sustained assessment process may entail. Dr. Moss stated that it is easy to repeat "sustained assessment" without understanding the implications of this process -- there may be concerns from scientists that increased usability might diminish the science as well as some discomfort on the user side of how to engage. Another part of the sustained assessment would be the release of interim special reports to meet user needs. Ms. Poppleton commented sustained assessment could include an evaluation of how NCA3 is being used. Dr. Melillo stated a sustained assessment can help frame different solutions to climate change.

With respect to the engagement process of a sustained assessment, Ms. Ann Marie Chischilly expressed tribal voices need to be heard. In NCA3, the 567 tribes were condensed into one chapter which did not capture the differences between what tribal governments need and will experience with respect to climate change.

Dr. Avery discussed the role of regional climate services in the vison of a sustained assessment. Dr. Moss noting that the assessment is not resourced as a service. Products may be spun off as service but they may not be originally designed as such. The committee could use RISA, Hubs, and CSC as examples of regional engagement.

Session 4. Public Comments

Mike Kuperberg (Executive Director, USGCRP, OSTP) addressed the uncertainty expressed in the meeting about Presidential transition. USGCRP is mandated by law to provide the NCA every four years. In the next Presidential Administration, business will go on as usual.

Isamu Higuchi (Environmental Engineer, National Aeronautics and Space Administration) explained that efforts to assess and prepare for the implications climate change were occurring within legal authority of Executive Orders and instructions from agency personnel. He reiterated Mike Kuperberg's comments that the NCA is on firm ground in the coming year.

Frank Niepold (Climate Education Coordinator, NOAA Climate Program Office; co-chair of the USGCRP's Education Interagency Working Group) commented that the effort to build awareness and ensure utilization of NCA3 was not commensurate with the effort put into production of the report. He asserted that awareness of NCA3 was very low despite containing highly critical information and requested that the committee consider the scale of effort on product generation versus utilization and process versus uptake.

The American Society of Civil Engineers provided written public comment that is available on the committee website.

September 14, 2016

Recap of Day One
Richard Moss, Senior Scientist, Pacific Northwest National Laboratory's Joint Global Change Research Institute at the University of Maryland, Committee Chair

Dr. Moss reminded the committee that their task is to provide targeted advice for the NCA4 and advice on how to move forward with a Sustained National Climate Assessment (SNCA). One of the issues will be to identify some of the components that will help to make this a more sustained process. He also highlighted: the strong and varied needs of tribes and the limitations of federal agencies in assisting tribes; the need for agencies operating in a research context to provide a process for translation into actionable, usable information; Dr. Melillo's four key words—trust, recursive outreach, communications, and networks—illustrate the move from supply side to the user side; and the need to analyze solutions rather than advocate for specific solutions.

Ms. Maxine Burkett also recognized the distinction between "services" and sustained assessment process, and the need to assess user needs over time. Dr. Knowlton emphasized the need to identify how to establish a two-way dialogue between the agencies producing the NCA and the end users.

Opening Remarks by Kathryn Sullivan, Under Secretary of Commerce for Oceans and Atmosphere

Dr. Sullivan opened her remarks by noting that NOAA is the host of this Federal Advisory Committee (FAC) on behalf of the USGCRP and recognized the value of the NCA.

The vision is that this Advisory Committee will be a mechanism for an ongoing forum of advice and input on what kinds of information and/or tools will be most useful and usable for the SNCA. The SNCA should be nimble, accessible, actionable, optimized, diverse, and distributed.

The federal government collects and archives a tremendous amount of data; the Advisory Committee can help the federal government to match users' needs to available data to help answer their questions. She added there is need for non-governmental organizations (NGOs), local governments, and the private sector to address the different, specific user communities' needs. In terms of engagement, the Advisory Committee should consider the various audiences of the report and advise on how best to engage with them.

Discussion

Dr. Melillo asked how to think about the model for the SNCA process, and whether there are a few things the committee should focus on. Dr. Sullivan suggested considering what the foundation of the SNCA process should be. An example was to examine extension and boundary organizations (for example, RISAs) to determine what works well across these frameworks.

Dr. Melillo also asked if there is a possibility of enhancing the coordination between agencies. Dr. Sullivan answered that when you get down to the regional and local levels, extension agents and personnel of different agencies tend to work well together for the betterment of their communities. The Advisory Committee needs to think about how to streamline and facilitate access to information by users. She emphasized "do once and well" and replicate the process; consider if aggregating clusters of products from several agencies would make a better product; and determine what the logic model is and what the priorities are.

Mr. Fleming drew an analogy between NOAA's products and services and wholesale vs. retail business models. NOAA and other federal agencies can't be all things to all parties, so perhaps NOAA could envision "wholesaling" some of its products and services while "retailing" others. Dr. Sullivan answered that this is a useful metaphor.

Dr. Whitehead asked about how to balance the element of equity. Services, like extension, make an effort to get out to underserved communities, but these communities won't be able to pay for "retail" services. Dr. Sullivan answered that NOAA maintains some of the traditional, free distribution channels, like weather radio broadcasts. The Advisory Committee could consider what combination of policies, tools and knowledge will achieve equity.

Dr. Moss asked for advice that will help this committee be successful. Dr. Sullivan answered that the committee should be thought partners to assess what is coming in the future and what the agencies should be thinking about in terms of broader science topics three, five, and ten years down the road. The group should be nimble with small teams providing synthesis and perspectives in pithy, short products. She reminded the committee that working groups are chartered groups of the Advisory Committee and need to stay within the legal boundaries of the FAC. She added that NOAA will relay Advisory Committee recommendations to OSTP and USGCRP.

Ms. Dell asked about the timescale that the SNCA is focused on. Dr. Sullivan urged the Advisory Committee to think about how the time scale (1-3 year, 10-20 year, and 50-70-100 year predictions) would influence what information users need and find actionable. She acknowledged that decision processes are changing and there is a need to better address risk based decisions making and thresholds in light of what the science tells us about the mix, frequency, and severity of events.

After Dr. Sullivan left the discussion, Drs. Avery and Melillo agreed that climate is very different than weather with regards to the science, decision-making, etc., and asked where the science is for sub-seasonal climate changes in meeting the nation's needs, especially related to the oceans and atmospheric connections. With regard to timescales, members offered

opportunities to consider: users often do not make the distinction between the different timescales (Dr. Maria Carmen Lemos); create seamless atmospheric forecasting products and determine who would distribute that information (Dr. Moss); determine if established framework for the shorter term predictions and warnings are appropriate for longer term projections that affect all businesses and sectors that are climate sensitive (Dr. Avery); understand the challenges around the ability to generate usable information to address long term and short term responses and how climate change exacerbates vulnerability (Mr. Fleming); and, identify what statutory and regulatory enabling environments would support decision making (Mr. Fleming and Ms. Burkett.)

Session 5. Sustained Assessment Process

Update on Ongoing Activities and Plans

Mike Kuperberg, Executive Director, USGCRP, Office of Science and Technology Policy

Dr. Kuperberg indicated the USGCRP believes that the sustained assessment will provide an opportunity to conduct groundbreaking research through a two-way communication process between the scientists and the user community and, in turn, highlight the areas that require additional investment and emphasis.

Dr. Kuperberg stated the USGCRP is currently incorporating sustained assessment in the NCA process. These include the model of the more user oriented NCA3, special reports with outreach and engagement components, a climate indicators website, improvements to NCAnet, and development of new climate scenarios.

The USGCRP receives formal external advice from the National Academies Committee to Advise USGCRP, PCAST, and the Advisory Committee for the Sustained National Climate Assessment, and previously the NCADAC. Based on the recommendations from these groups, the USGCRP is building a "resilience enterprise." This enterprise will include the existing Climate Resilience Toolkit and the Climate Data Initiative, and will add new components of subject matter expert capability (connecting experts with the user community) and a private-federal data partnership (take raw data into useable, actionable information).

Discussion

Mr. Fleming, Dr. Dunlap, and Dr. Whitehead discussed the importance of engagement with both federal agencies and the user community. Dr. Kuperberg indicated that the USGCRP is open to including and collaborating with any federal agency who express interest, while NCAnet, a new subject matter expert capability program, and a new private-federal data partnership will engage the user community.

Dr. Joppa and Mr. Fleming asked a number of questions concerning USGCRP's vision of a sustained process. Dr. Kuperberg would like reports to be available on time and meeting Dr. Melillo's four criteria: trust, recursive outreach, flexibility, and networks. Dr. Kuperberg also

expressed the development of climate indicators in the near future will also be important to the sustained process.

The members (Dr. Avery, Dr. Lemos, Ms. Burkett, Dr. Melillo, Dr. Whitehead) discussed how a sectoral-focused chapter may limit integration across federal agencies and non-federal entities. Dr. Kuperberg indicated that the NCA process is becoming more regionally and cross-sector focused, therefore integration will occur at the regional level. The NCA3 for example, brought together 50 individual state assessments to become the National Climate Assessment.

Session 6. Climate Science Special Report and Quadrennial Report (NCA4): Update on Plans and Requests for Advice

Climate Science Special Report (CSSR)

Don Wuebbles, Assistant Director for Climate Science, Office of Science and Technology Policy

The Climate Science Special Report (CSSR) serves as a prologue to the NCA by providing an updated detailed analysis of how climate change affects weather and climate across the United States. The CSSR is written for technical experts while providing an executive summary written for Congress and public audiences that will be used as the basis for the science summary of NCA4. The CSSR provides foundational information and projections for climate change, including extreme events, and improves end-to-end consistency in sectoral, regional, and resilience analyses for NCA4. A CSSR for NCA4 is due to be published in October 2017 following internal review, agency review, and review by the National Academy of Sciences.

OSTP and USGCRP serve as the CSSR organizing body with NOAA as the lead agency. The Science Steering committee is comprised of federal Convening Lead Authors [Don Wuebbles (OSTP), David Fahey (NOAA), and Kathy Hibbard (NASA), Ben DeAngelo (USGCRP), Wayne Higgins (NOAA), Jake Kaye (National Aeronautics and Space Administration, NASA), Dorothy Koch Department of Energy (Department of Energy, DOE), and Russ Vose (NOAA)]. There are 28 lead authors representing federal, academic, and industry scientists with contributing authors as needed.

As part of an early selection of climate projection models for NCA4, CSSR authors are applying a weighting scheme to models included in the Coupled Model Intercomparison Project 5 (CMIP5). Weighting is based on how well models match observations in the United States and globally. This weighting technique improves model predictions for severe events.

The CSSR also includes downscaled climate projection analyses for NCA4 in coordination with the USGCRP Climate Scenarios Task Force. This downscaling will include mid and high emission scenarios and will provide specific analyses for different regions. State fact sheets will be developed from this analysis.

Risk framing is also included in CSSR due to its importance in resilience analyses based on potential climate impacts. This framing will distinguish between the two questions, "What is most likely to happen?" and "How bad could it be?" This initial work towards risk framing can be expanded in future assessments.

Discussion

Dr. Lucas Joppa asked about benchmarks for climate models included in the CSSR. Dr. Wuebbles clarified that all CMIP5 models were included.

Dr. Melillo asked about how the extremes of a range of possible outcomes are considered in the risk discussion. Dr. Wuebbles replied the CSSR now includes comparisons of the impacts from low-probability, worst case scenarios to the most likely scenario.

There were a number of questions from the Advisory Committee as to the scope of CSSR. The focus is the U.S. (including Hawaii and Alaska, but not Pacific Islands); the model output maps also show Canada and Mexico. Coastal and nuisance flooding associated with storm surge will be examined. Chapter 15 looks at potential surprises due to combined effects of extreme events. It is not yet possible to aggregate analyses to examine watersheds.

Ms. Dell asked about risk and uncertainty in model projections. Dr. Wuebbles replied the models currently underestimate severe precipitation, and weighting may better capture precipitation amounts. The CSSR also includes a discussion of uncertainty and how events could be more severe than model predictions.

Quadrennial Report (NCA4)

Ben DeAngelo, Deputy Director, USGCRP, Office of Science and Technology Policy

Ben DeAngelo began his presentation by discussing an example of how the NCA has been used by the federal government to inform or influence a decision. At the Environmental Protection Agency (EPA), a major decision was made under the Clean Air Act in 2009 that greenhouse gases threaten the health and the future welfare of Americans. The specificity of NCA to the U.S. is key for these types of decisions.

Mr. DeAngelo provided an overview of the NCA mandate established by the Global Change Research Act of 1990. In contrast to the broader scope of Intergovernmental Panel on Climate Change (IPCC) reports, the NCAs focus heavily on domestic impacts. NCAs are also more user-friendly than IPCC reports.

NCA4 will build off aspects of NCA3 deemed crucial to its success. These include: assessment based on broad scientific and technical inputs; stakeholder engagement; clear communication principles; an accessible web-based report; transparent connection between findings and underpinning science; and an extensive review process. NCA3 is also undergoing assessment and evaluation through interviews, online surveys, citation analysis, and web analytics with the results informing NCA4. NCA4 will be supported by four topical reports and special

assessments, including the Climate Science Special Report, Second State of the North American Carbon Cycle Report, Climate and Health Assessment (April 2016) and Food Security Assessment (December 2015).

NCA4 presents several opportunities and challenges. The most popular chapters from past assessments are the regional chapters. NCA4 will move further in that direction with greater detail, specificity and quantitative analysis at a regional scale. NCA4 will better quantify risk metrics, especially with regards to high-impact, low-probability events. There will also be more information on adaptation needs and opportunities and areas for mitigation, including a discussion of the future climate implications of multiple policy pathways. Climate intervention and geoengineering will be covered in the CSSR based on the recommendation of a National Academies of Science report.

Mr. DeAngelo provided an overview of the process for NCA4, which is scheduled to be released in late 2018. The Climate Science Special Report is currently underway and due to be released in 2017 to provide a scientific foundation to NCA4. There was an initial public comment periods on the NCA4 draft prospectus and outline that closed July 29, 2016. There are currently open calls for non-federal regional chapter leads (closed September 30) and technical inputs (closed January 15). Each national analysis will have a federal convening lead author (CLA) with regional chapters led by a non-federal author. These regional chapters will contain material with region-specific sectoral focus areas and case studies. The non-federal chapter lead will be responsible for choosing author teams with suggestions from the steering committee via a nomination process. This chapter writing process will be carried out using the traditional approach of synthesizing literature, designing a blueprint, and generating useful findings.

Discussion

The members discussed mechanisms for identifying and engaging NCA user groups. Dr. Knowlton asked if USGCRP would have the resources to identify key questions from user communities. Mr. DeAngelo answered that it would depend on the scope and scale but there could be a mechanism that uses a recursive approach to generate feedback from the user community.

There were several questions about the regional chapters of NCA4. Ms. Dell asked how RISAs, CSCs, and Climate Hubs would be integrated. Ms. Chischilly asked whether tribes would be included in each regional section and whether non-peer reviewed literature produced by tribes would be accepted. Mr. DeAngelo explained there will be a series of webinars to inform established networks so they can help spread the word about regional analyses. Lead authors for regional chapters may come from RISAs, CSCs, and Climate Hubs. In addition to these webinars, the USGCRP has discussed the idea of a tribal workshop. There will be a standalone sectoral chapter on tribes, and that as long as the source is known, non-peer reviewed literature could be included.

Dr. Lemos asked where engagement and actionable knowledge (decision support) will be in NCA4, as there is no longer a separate decision support chapter as in NCA3. Dr. Lemos stressed the need to include mechanisms and models of engagement, drawing from the applied social

science literature. Dr. Melillo, Ms. Dell, and Dr. Avery commented on the limitations of the NCA3 decision support chapter, which was viewed by some audiences as too theoretical and abstract. Mr. DeAngelo explained that decision support will now be integrated within each chapter to better incorporate resilience and adaptation needs.

Dr. Avery and Dr. Knowlton asked several questions about the list of NCA4 chapter subjects, and Mr. DeAngelo clarified the NCA4 chapter contents have not been fleshed out in detail. The steering committee will provide broad parameters and scoping. Dr. Melillo also emphasized the utility of a printed high-level summary/NCA highlights documents.

Dr. Moss asked what guidance the Advisory Committee could provide on current NCA4 activities. Mr. DeAngelo suggested that the Advisory Committee could provide input on risk framing, crafting messages tailored to different audiences, engaging groups not traditionally engaged in the NCA process, and ideas of derivative products to come out of NCA4. The Advisory Committee could also provide input on strategies to build a sustained assessment process.

Session 7. Developing a Strategy for Sustained Assessment

Dr. Moss opened this session by explaining that it was intended to begin exploration of several topics that the Advisory Committee might wish to explore in its future work. The first presentation, by Rear Admiral Tim Gallaudet, is intended to serve as background to the challenge of organizing and coming to terms with the diverse information needs of different users, and evaluating resulting requirements for different products and underlying data collection, modeling, and analysis. Dr. Moss noted that there have been many sectoral and regional evaluations of user needs, and a challenge was to develop a typology of uses and products that could guide development of resources for decision makers. The second presentation, by Advisory Committee Member Dr. Maria Carmen Lemos, provides an introduction to ways of thinking about sustaining interactions between users and members of the research community involved in producing information that serves as the scientific foundation for assessments. User interactions can be time consuming, and not all scientists have interests or capability to work closely with end users. What arrangements are being devised to address this challenge? The last two presentations, by Dr. Richard Wright and Dr. David Easterling, introduce different aspects of the challenge of providing climate information for engineering and architectural design processes. Dr. Wright, speaking from the perspective of engineering design, will describe expectations and information needs of planning long-lived infrastructure under non-stationary climate. Dr. Easterling will provide an update on climate science related to extreme events, which have the potential to lead to infrastructure impacts and cascading failures across systems. Dr. Moss requested that members keep the broader purpose of developing the Committee's work plan in mind as they consider and discuss the presentations.

National Climate Assessment: Navy Thoughts on Uses and Typology

Rear Admiral (RDML) Tim Gallaudet, Oceanographer of the Navy

RDML Tim Gallaudet discussed the Navy's mission today, potential impacts of climate change on their mission, and how the Naval Meteorology and Oceanography Command designs products to meet the environmental intelligence needs of its users.

The oceans play a critical role in today's societies and economies, and the mission of the Navy is to protect an increasingly competitive maritime domain. Naval forces and resources are distributed across the world to meet this mission. Looking to the future, the effects of climate change, including a seasonally ice free Arctic, tropical cyclone intensification, and increased flooding and extreme drought, will impact all naval missions worldwide.

Naval oceanography today encompasses a range of activities with the overall goal of ensuring fleet safety and mission effectiveness. These include data collection, processing/prediction, impact assessment, and dissemination of information to inform decision making. There are various ways to frame products and uses of environmental information, including mission/sector, physical scale, scale of force (from fleets to individual sailors), climate/weather phenomenon, and domain (sea, air, land, cyber). The Navy does not use one framework across the board, instead choosing the best framework for each situation. Recent examples of products include strategic support for the effects of El Niño, internal ocean wave forecasts to inform operational anti-submarine warfare, tactical support during the search for pirates off Somalia, and modeling geographic and weather effects on ship radar coverage.

RDML Gallaudet concluded by recommending the committee address all users with multiple product types even if it comes with higher costs, since redundancy is sometimes helpful. Informing the public about climate change is important work since climate change will likely be a major driving force of future environmental and societal instability, and the oceans are undergoing major changes due to human activity. He also noted that information warfare is emerging as a major arena, and that data integrity and assurance should be kept in mind when dealing with climate information.

Discussion

Dr. Moss asked about creating a limited number of manageable products for a large and diverse user base. RDML Gallaudet commented that the organizational structure of the Navy and constant communication are critical to manageable product development.

Dr. Whitehead asked about the military's role as a trusted messenger that can help communities digest and adapt to change and whether the Navy could be potential partners of engagement. RDML Gallaudet affirmed the Navy wants to be as proactive and supportive as possible to help communities adapt and that local level assets of the Navy could definitely be considered partners.

Mr. Fleming asked about the balance between pushing information out to users versus users requesting specific types of information. RDML Gallaudet described how his organization follows an iterative process of releasing products and users providing feedback about new needs.

The Science of Usability and How It Can Support Sustained Assessments

Maria Carmen Lemos, Professor of Natural Resources and Environment, University of Michigan School of Natural Resources and Environment

Dr. Lemos discussed how the science of usability can be used to bridge the observed gap between climate information production and public uptake.

While climate scientists and data producers generally believe they are producing useful information, the uptake rate of this information by decision makers is often low. There are two major predictors of this disconnect between producers and users: (1) poor fit of information to a given problem or decision process, and (2) the interplay between new climate knowledge and already well-established information used in current decision-making processes. There are several ways to overcome these barriers, including co-production of information and improved usability through value added products and customization.

The boundary chain/network chain model of engagement connects climate scientists to information users through a series of boundary organizations. This model allows for climate scientists to reach many stakeholders quickly, decreases co-production transaction costs (especially human resources, trust and legitimacy) by exploiting existing connections between organizations. Dr. Lemos provided an example from the Great Lakes Integrated Sciences and Assessments (GLISA) program, which held a mini-grant competition to engage partner organizations to work with GLISA.

Dr. Lemos concluded by outlining potential activities for the committee, including developing sustained engagement approaches and preparing a short report on options and mechanisms for engagement in the context of the NCA. Topics that could be covered in this report include the cost of sustained relationships, stakeholder fatigue, diminishing returns, decision scaling, and discrepancies between what users ask for and what they really need to support different decisions.

Discussion

Dr. Whitehead asked whether there had been a systematic analysis of the mini-grant program partnerships with lessons learned. Dr. Lemos answered that they are currently doing this analysis, and a formal evaluation is scheduled to be released by the end of the year.

Adapting Infrastructure and Civil Engineering Practice to a Changing Climate

Richard Wright, Chair of the ASCE Committee on Adaptation to a Changing Climate

Dr. Wright discussed findings from a white paper prepared by the Committee on Adaptation to a Changing Climate for the American Society of Civil Engineers (ASCE) on the challenges of adapting current engineering practice for a changing climate.

The ASCE consists of over 150,000 professional members who are bound by the ASCE code of ethics to follow principles of sustainable development in their practices. The ASCE also has a set of fairly forward looking policies that address issues surrounding climate change. ASCE members work on a wide range of infrastructure projects in the built and natural environments. These projects have long service lives from 10 to 100+ years and must be designed to withstand weather and climate hazards over that period. The ASCE produces National Consensus Standards that are widely cited in building codes and other regulations that provide guidelines for designing buildings to withstand hazards.

One of the major challenges for engineers trying to design for a changing climate is that they do not have quantitative information on future weather and climate extremes. They particularly need information about low-frequency, high-impact events. Engineers also will need to shift from the stationarity principle to a new paradigm of a changing climate with a range of possible futures. The observational method is a technique that allows for more sustainable and adaptable design as new knowledge is continually incorporated during and after construction. In this method, infrastructure projects are designed to the most probable future conditions but include ways of modifying the structures for worst case scenarios.

Dr. Wright concluded by identifying key information needs for engineers, including authoritative forecasts of most likely and worst case scenarios for climate and weather extremes (annual exceedance probabilities from 0.1-0.001) for 20, 50, and 100 years into the future. This information also needs to be presented in engineering form to be most useful. Since the ASCE standards are updated every 5-6 years, there are opportunities to accommodate changing information.

Discussion

Dr. Melillo asked if sea level rise projections as presented in previous NCAs were useful for engineers. Dr. Wright replied that this information was becoming more useful.

Dr. Riley Dunlap asked how broad the climate change concern was among civil engineers. Dr. Wright answered that sustainability is becoming the policy of ASCE and that there will be education and training programs to ensure members are embracing sustainability.

Dr. Lemos asked for clarification about the standard updating process, and Dr. Wright explained that it is a consensus-based process, and organizations with a stake in the standards are given the opportunity to participate.

Mr. Fleming, Ms. Dell, Dr. Moss, and Dr. Wright discussed the need for mutual comprehension between engineers and scientists to ensure climate information can be applied properly by engineers, given its uses and limits. Engineers are seeking authoritative forecasts with best estimates of future conditions in order to make decisions, and they are used to dealing with statistics derived from stationary climate conditions. Projections of climate change over future decades are shrouded in deep uncertainty because the trajectories depend on human decisions that affect future emissions (for example, implementation of international agreements or policies such as energy efficiency improvements), as well as uncertainties in the response of the climate

system. "Most likely" and "worst case" mean different things in this context, and it is important that those using climate projections in design processes understand the differences.

Hydrologic Extremes

David R. Easterling, Director, National Climate Assessment Technical Support Unit at NOAA's National Centers for Environmental Information (NCEI)

Dr. Easterling discussed the findings of the Task Force on the Feasibility of a Climate Extremes USGCRP Assessment, resources for extreme event information, and recent work to incorporate future climate change into precipitation intensity-duration-frequency (IDF) curves as part of the Department of Defense (DOD)'s Strategic Environmental Research and Development Program (SERDP).

Task Force on the Feasibility of a Climate Extremes USGCRP Assessment: This task force was asked to consider the purpose and scope of a USGCRP special report on extreme events following the last U.S.-focused report on extremes released in 2008. The task force evaluated available information about extreme events and identified several challenges, including differences in the state of science for different extremes (e.g., drought, floods, etc.) and the diversity of user information needs. Considering these challenges, the task force recommended conducting a series of shorter, targeted assessments focused on different extreme event types and user bases. These assessments could also be "living documents" with links to available tools.

Resources for extreme event information: A variety of resources exist to provide extreme event information to users, including previous IPCC and USGCRP assessments and special reports and the Climate Resilience Toolkit. Oak Ridge National Laboratory and several partners are also developing an extreme event portal due to come online soon.

Climate change and extreme precipitation: As global temperatures increase, atmospheric water vapor content increases, leading to more extreme precipitation events. Over the past five decades, the frequency of extreme precipitation events has increased in the U.S. In the future, rare heavy precipitation events are projected to become more common. These trends are now beginning to be considered in calculations of return period values and probable maximum precipitation amounts used by engineers to set design criteria. For example, in a recent project funded by SERDP, NCEI scientists modified existing IDF curves used for DOD design guidance to account for increased atmospheric water vapor content in a warmer climate.

Discussion

The members discussed the requirements for forecasts to be considered authoritative and how to merge authoritative climate modeling and forecasting with the regulatory environment. Dr. Easterling explained that while there is significant uncertainty, authoritative forecasts are based on the best available science. Ms. Dell and Mr. Fleming discussed how engineers and utilities account for climate change and uncertainty in climate projections in their practice. They identified the question of the best process to both improve science and keep engineering projects

cost-effective as an important topic for further consideration. Mr. Fleming commented that utilities would like information about multiple plausible futures and need better strategies to manage uncertainty. Ms. Burkett commented on the distinction between science and decision-making and raised the question of how to best provide authoritative information to address liability concerns and meet the needs of decision-makers.

Mr. Niepold commented on the fact that humans are interacting with a range of possible futures and the need for education to help people understand the processes that drive climate projections.

September 15, 2016

Recap of Day Two
Richard Moss, Senior Scientist, Pacific Northwest National Laboratory's Joint Global Change Research Institute at the University of Maryland, Committee Chair

Dr. Moss presented several forward-looking slides and charged the committee to split into breakout groups and develop ideas for useful advisory products that can be developed during the next 4-6 months (see details below). He identified possible products for this committee as verbal advice from these discussions, consultation activities with targeted stakeholder groups, issues or options papers, special reports, pilot sustained assessment activities, and guidance documents. Based on the discussions, he offered two initial topics and potential options to consider:

1) Partnerships for Actionable Knowledge
    a. Charged to develop recommendations to Advisory Committee on options for its next steps to explore how the SNCA can advance its "enduring partnerships" objective
    b. Potential topics could include useful information not being used, groups co-developing strategies (referring to Dr. Lemos' presentation), and state of practice and different types of partnerships or incentives.
2) Extreme Events and Design Standards
    a. Charged to determine how to set up a sustained dialogue among climate science, engineering, and architecture communities to identify future extremes for design standards.
    b. Potential topics could include requests for authoritative forecasts of climate and weather extremes and what is possible for risk management in the context of deep uncertainty.

<u>Discussion</u>

The Chair clarified questions about the charge, the breakout group products, and their process. In addition to considering the specific topic requested, each group was also asked to identify any additional topics that its members thought important to consider in the future work plan.

Session 8. Initial Advisory Group Products

The Advisory Committee separated into two breakout groups focused on Partnerships for Actionable Knowledge and Extreme Events and Design Standards. The breakout groups reported to the entire meeting in Session 9; therefore, summaries of each breakout group discussion can be found in Session 9.

Breakout Group: Partnerships for Actionable Knowledge

Led by: Dr. Knowlton
Facilitated by: Dr. Whitehead
Members Present: Ms. Burkett, Dr. Dunlap, Dr. Lemos, Ms. Chischilly, Ms. Poppleton, Dr. Moss
Others Present[1]: Therese Carter, Caitlin Simpson, Mike Kuperberg, Virginia Burkett, Emily Cloyd and webinar participants

Breakout Group: Extreme Events and Design Standards

Facilitated by: Ms. Dell
Members present: Dr. Avery, Mr. Fleming, Dr. Joppa, Dr. Melillo, and Dr. Moss
Others present: Ben DeAngelo, Don Wuebbles, Fred Lipschultz

Session 9. Provide Recommendations for Initial Advisory Products

Dr. Knowlton reported for the Partnerships for Actionable Knowledge group. The group developed a "wish list" of what is needed for partnerships and engagement that includes: guidelines or case studies on how to use and apply the NCA3; how the NCA is being applied at different scales regionally, locally, or county-level; evaluation of use, usability, and engagement; and identification of users (i.e. regulators, policy makers, etc.). This group also wondered if there was a way to track relevant reports that already exist, and what barriers might exist to using NCA data for sustaining engagement. Specific actions that this group discussed included a novel way to participate in or track engagement; ways to sustain engagement; and creating useable data. Other possible products include a logic model; identification of existing engagement practices and potential new approaches; and a long term synthesis or literature review of what has already been done and whether or not it has been successful. The group may want to examine how a sustained process can help communities that must use NCA4 on their own.

Mr. Fleming reported for the group discussing extremes for design standards. The group discussed five additional ideas: indicators, coastal issues, design standards, gap analysis, and business process mapping. The committee should continue to advance what is being done with regards to physical observations, impacts, and resiliency indicators. With respect to coastal issues, vulnerability to storm surge and sea level rise is not well understood, and there has been a heightened focus on redesigning cities and infrastructure of vulnerable areas. The gap analysis should compare the current NCA, SNCA, and Prepare the Nation report. It was recommended

[1] Attendees who were not committee members were asked to provide input or clarifications upon request; however, they did not provide synthesis or recommendations.

that this be the first thing the Advisory Committee does. A business process mapping would look at multiple sectors to unveil climate sensitivities for each and map business functions to the climate information spectrum. Advising on extremes and averages design standards is a very tall lift for the FAC, but they can advise how to scope the conversation.

Ms. Letson offered to coordinate with USGCRP to provide more details for the gap analysis and logic models. She also reminded that all documents and presentations will be available to the public and the committee via the website.

The actions that the committee agreed to are as follows:

1. Develop Gap Analysis of SNCA Process
    a. Request status of USCGCRP efforts on Indicators
    b. Modes of engagement within RISA/Hubs/CSC
2. Establish subcommittees
    a. Partnership for actionable knowledge
        i. Scoping analysis and options
    b. Coastal issues (impact and multiple factor evaluation)
    c. Climate data inputs into a/e design standards (scoping for others to carry forward)
3. Request additional information:
    a. Business Process Impact
        i. Request briefing on Water Utility Climate Alliance report
    b. Tribal case studies
4. Provide individual responses to request for advice
    a. NCA4
5. Next meeting date: Feb or March 2017, in Washington DC, working with members to set a date, nail it down and make it formally available

Ms. Letson reminded the members that they may contribute to NCA4 as individuals but not as an Advisory Committee member. The Advisory Committee may only be able to provide limited advice for NCA4 due to timing. In the longer term, the committee's role is to advise on the sustained process including the quadrennial report.

Ms. Letson closed the meeting by reminding the committee that all the meeting documents will be posted to the website by the end of the week, and minutes will be posted within 90 days.

Appendix I: Attendance

Advisory Committee for the Sustained National Climate Assessment members in attendance: Dr. Richard Moss (Chair), Ms. Jan Dell (Vice-Chair), Dr. Susan Avery, Ms. Maxine Burkett, Ms. Ann Marie Chischilly, Dr. Riley Dunlap, Mr. Paul Fleming, Dr. Lucas Joppa, Dr. Kim Knowlton, Dr. Maria Carmen Lemos, Dr. Jerry Melillo, Ms. Kristen Poppleton, and Dr. Jessica Whitehead

Attendees (in person): Claire Adrian-Tucci, John Balbus, Jack Barker, Dan Barrie, Ann Bartuska, Virginia Burkett, Lizanne Carlos, Therese Carter, Emily Cloyd, Ben DeAngelo, David Easterling, Tara Elliot, Jason Gallagher, Tim Gallaudet, Gerald Geernaert, Ann Goodman, Alona Gutman, Wayne Higgins, Isamu Higuchi, John Holdren, Mike Kuperberg, Allison Leidner, Brian Leshak, Kristin Lewis, Fred Lipshultz, Frank Niepold, David Reidmiller, Karena Ruggien, Mark Shimamoto, Caitlin Simpson, Richard Spinrad, Kathryn Sullivan, Kelly Taylor, Erik Tucker, Sarah Weiskopf, Tris West, Richard Wright, and Don Wuebbles

Attendees (on webinar): Sarah Alcala, Susan Aragon-Long, Ann Bartuska, Chelsea Combest-Friedman, Jason Gallagher, Alona Gutman, Alona Jay, Allison Leidner, Kristin Lewis, Andy Miller, Alison Mize, Julie Morris, Katie Reeves, Richard Spinrad, Nick S, Amanda Staudt, Adam Stein, Ali Stevens, Jenna Totz, and Darrell Winner

Advisory Committee for the Sustained National Climate Assessment staff in attendance: Ms. Laura Letson, Ms. Elizabeth Akede, Dr. Dorothy Dick, Ms. Laura Early, Dr. Kyrstin Fornace, and Dr. Laura Newcomb

Appendix II: Acronyms

ASCE: American Society of Civil Engineers

CLA: convening lead author

CMIP5: Coupled Model Intercomparison Project 5

CSC: Climate Science Center

CSSR: Climate Science Special Report

DFO: Designated Federal Officer

DOD: Department of Defense

DOE: Department of Energy

DOI: Department of the Interior

EPA: Environmental Protection Agency

FAC: Federal Advisory Committee

FACA: Federal Advisory Committee Act

GCRA: Global Change Research Act

GLISA: Great Lakes Integrated Science Assessment

IDF: Intensity-Duration-Frequency

IPCC: International Panel on Climate Change

NASA: National Aeronautics and Space Administration

NCA: National Climate Assessment

NCADAC: National Climate Assessment and Development Advisory Committee

NCEI: National Center for Environmental Information

NOAA: National Oceanic and Atmospheric Administration

OSTP: Office of Science and Technology Policy

PCAST: President's Council of Advisors on Science and Technology

RISA: Regional Integrated Science Assessment

SERDP: Strategic Environmental Research and Development Program

SGCR: Subcommittee on Global Change Research

SNCA: Sustained National Climate Assessment

USDA: United States Department of Agriculture

USGCRP: United States Global Change Research Program